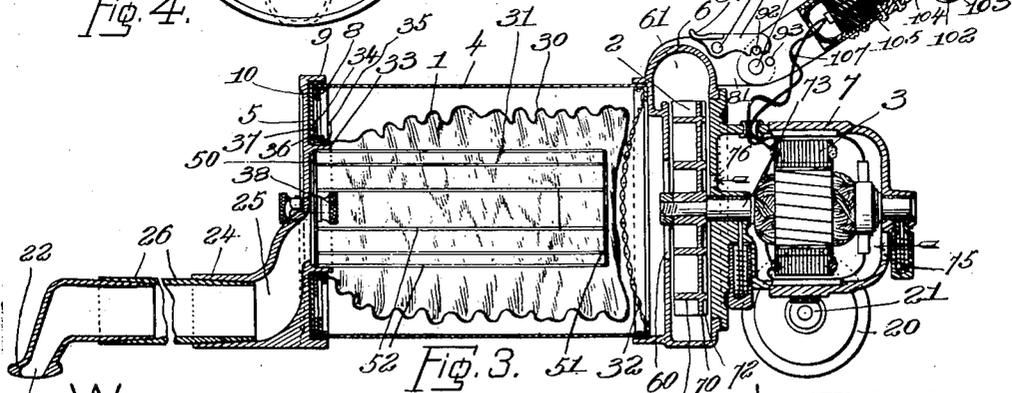
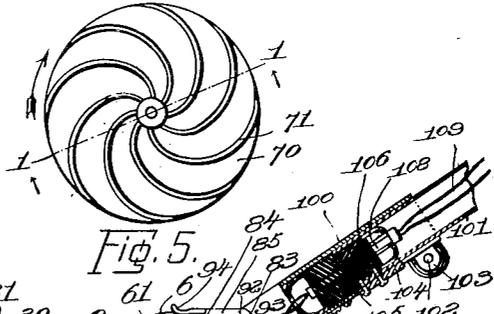
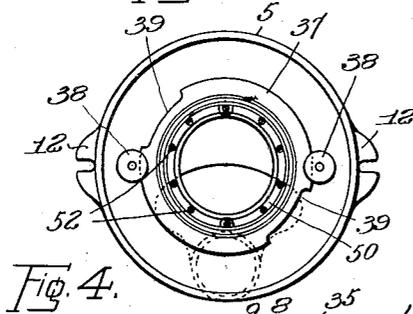
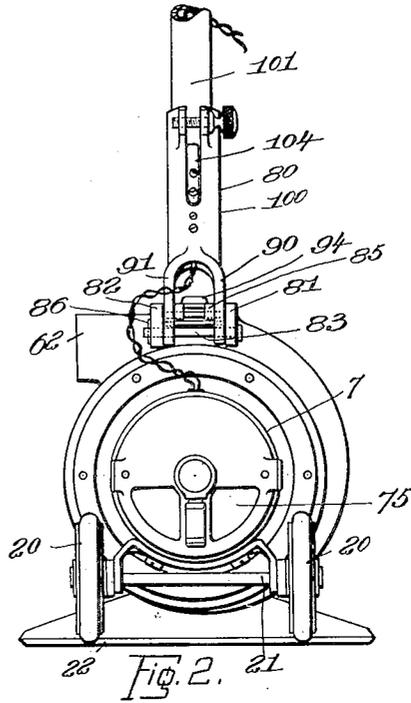
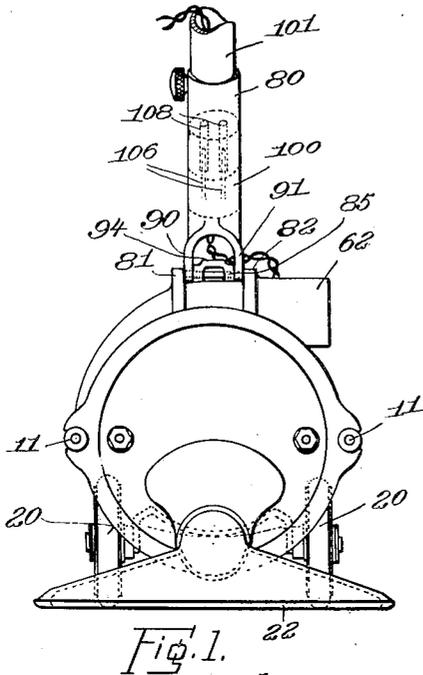


G. W. ALLEN.
 PNEUMATIC CLEANER.
 APPLICATION FILED OCT. 13, 1913.

1,124,684.

Patented Jan. 12, 1915.



WITNESSES
 Wm. Helmer
 Geo. C. Stubbins

INVENTOR
 George W. Allen
 by his attorney
 Phillips, Watson & Field

UNITED STATES PATENT OFFICE.

GEORGE W. ALLEN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO B. F. STURTEVANT COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

PNEUMATIC CLEANER.

1,124,684.

Specification of Letters Patent.

Patented Jan. 12, 1915.

Application filed October 13, 1913. Serial No. 794,841.

To all whom it may concern:

Be it known that I, GEORGE W. ALLEN, a citizen of the United States, residing at Hyde Park, Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Pneumatic Cleaners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to pneumatic cleaners, and more particularly to portable, motor-driven, suction cleaners.

One object of the present invention is to improve the construction of the suction fan so as to provide air cooling for the motor and also to better balance the fan.

Another object of the invention is to improve the construction of the dust collector so as to present a large air filtering surface and at the same time to keep the size of the dust collector conveniently small.

Another object of the invention is to improve the means of attaching the dust bag to the removable cover of the dust bag chamber.

Another object of the invention is to construct and position the cleaner nozzle so as to permit the cleaner to clean under radiators, or low articles of furniture.

Still another object of the invention is to provide an improved handle and handle connection for the cleaner.

With the above objects in view, the present invention consists in the pneumatic cleaner hereinafter described and particularly pointed out in the claims.

In the drawings which illustrate the preferred embodiment of the present invention, Figure 1 is a front elevation; Fig. 2 is a rear elevation; Fig. 3 is a central vertical longitudinal section of the cleaner; Fig. 4 is a view of the inside of the front cover; and Fig. 5 is a front view of the fan, the section along which the cross section of the fan shown in Fig. 1 is taken, being indicated by the line 1-1.

The pneumatic cleaner illustrated in the drawings is of the portable, self-contained, motor-driven type.

The cleaner comprises at the front a dust

collector 1, behind it a suction fan, or air pump 2, and behind the fan an electric motor 3 for driving it. These are contained in the cleaner casing which comprises a cylindrical dust-bag-containing shell 4 and a removable front cover 5, a fan casing 6 and a motor casing 7. The cylindrical drum or shell 4 is formed of sheet aluminum and is secured by rivets at its rear end to the fan casing 6 which is cast aluminum. Bolted to the rear of the fan casing 6 is the motor casing 7, also of cast aluminum. The front of the cylindrical sheet metal drum or shell 4 is finished by means of an internally flanged collar or ring 8 which is secured within the end of the shell. The front cover 5 has a rearwardly extending annular flange 9 which fits over the end of the sheet metal drum 4. The inner face of the front cover 5 is provided with an annular rubber gasket 10 which fits against the end of the drum 4 to form a dust tight closure. The front cover 5 is held in place by means of swing bolts and thumb nuts 11 which are hinged to the sides of the drum 4 and fit into slotted ears 12 on the sides of the front cover.

The rear of the cleaner is supported by means of two rubber-tired wheels 20 carried upon the ends of an axle 21 which is carried beneath the motor casing 7. The front of the cleaner is supported by means of the nozzle 22, the weight of the cleaner serving to hold the nozzle against the floor. The nozzle 22 has the wide intake slot 23 usual in carpet cleaning suction nozzles. The lower end of the front cover 5 is provided with a nipple 24 through which passes the intake opening 25 for the dust laden air. The rear end of the nozzle piece 22 is externally tapered to fit into the internally tapered mouth of the nipple 24 so that when the cleaner is ordinarily used, the nozzle piece 22 is frictionally connected directly with the front cover 5.

In order to adapt the cleaner for cleaning the floor beneath radiators and low articles of furniture, an extension pipe 26 is provided. This extension pipe fits in the end of the nipple 24 and carries on its forward end the nozzle piece 22. Since the nipple 24 is at the extreme lower edge of the front cover 5, the nozzle can be passed under articles having only a very few inches clear-

ance above the floor. While the extension pipe 26 may be of any convenient length, it is found that the most satisfactory length for ordinary household purposes is about two feet.

The dust collector 1 comprises a cloth dust bag 30 which is loosely gathered over a wire cage 31 and is inclosed in a cylindrical dust bag chamber formed by the cylindrical sheet metal drum 4, the front cover 5 and a screen 32 at the rear. The inlet passage 25 curves up from the mouth of the nipple 24 so that the inlet passage opens on the inside of the front cover 5 near its center. Surrounding the mouth of the inlet 25 is a rearwardly extending annular flange 33. The mouth of the dust bag 30 is removably secured around this flange by means of a dust bag ring or collar 34. This dust bag ring 34 has a cylindrical part 35 which fits loosely around the flange 33 and around which the mouth of the dust bag is securely held by means of a wire 36. On the forward end of the dust bag ring 34 is formed a flat outwardly extending flange 37 which is held securely against the rubber gasket or packing 10 by means of thumb nuts 38 which are threaded on pins projecting from the inner face of the front cover 5.

In order that the dust bag ring 34 may be easily put on and taken off to empty the dust bag, the flange 37 has two oppositely disposed cut-away portions 39. When the dust bag is put in place, the dust bag ring 34 is slipped over the flange 33, the cut-away portions 39 fitting inside the thumb nuts 38. Then the ring is given a partial rotation until the edge of the flange is turned beneath the thumb nuts 38 which are turned up to clamp the dust bag ring in place. This provides a simple and cheap device for removably holding the dust bag in place.

The cage 31 is cylindrical in outline of about the same diameter as the flange 33 and nearly equal in length to the dust bag chamber. The cage is made by two wire rings 50 and 51 at the front and rear ends respectively which are connected by a number of longitudinally extending, parallel wires 52. The front end of the cage fits within the flange 33 and is secured thereto by means of riveted staples passing through the flange. The dust bag 30 is of considerably greater diameter than the cage 31 although it is somewhat smaller in diameter than the shell 4. The dust bag when removed and fully extended is four or five times as long as the cage 31, so that, as shown in the drawings, when the dust bag is in place it is gathered or puckered over the cage 31. In putting the dust bag into the cleaner, the dust bag ring 34 is first secured to the front cover and then the dust bag is gathered or puckered over the cage

31, after which the cover with the attached dust bag is applied and clamped in place by the swing bolts and thumb nuts 11. Since the cage 31 reaches nearly to the screen 32, the dust bag is prevented from coming off the end of the cage by means of the screen 32. The cage 31 serves to keep the dust bag partially distended at all times and to preserve a more uniform lengthwise gathering or puckering of the bag and prevent it from becoming bunched at any one portion.

When the fan is running, the air distends the dust bag substantially as shown in the drawing and when so distended the dust bag, by virtue of the manner in which it is gathered, presents a much larger filtering area of cloth than would a bag of approximately the length of the dust bag chamber. This allows the air to be more easily drawn through the cleaner and at the same time as effectively separates the dust therefrom. The filtered air from the dust bag chamber passes to the center of the fan through an inlet 60 in the front wall of the fan casing. The air is discharged from the periphery of the fan into a scroll-shaped discharge chamber 61 terminating in a discharge nozzle 62 at the top of the cleaner.

The fan 2 consists of a flat circular web 70 and curved air-impelling blades 71 and 72 formed on the front and rear faces of the web respectively. The fan is driven in the direction indicated by the arrow in Fig. 5. The blades 71 radiate from the central hub being curved backwardly as they near the periphery of the fan. The blades 72 are similar in shape to the blades 71 except that, as shown in Fig. 3, they are much shallower. The fan is mounted on the forward end of the motor shaft 73. The rear end of the motor casing has an air inlet opening 75 therein and the front wall of the motor casing, which forms the rear wall of the fan casing, has therein a small opening or air passage 76 near the center of the fan. The passage 76 serves as an inlet opening for the shallow blades 72 which cause a circulation of air as indicated by the arrows through the openings 75 and 76, to air cool the motor. The air sucked through the motor by the blades 72 is discharged into the common discharge chamber 61. The construction of the fan in which the shallow motor-ventilating blades 72 are formed on the rear face not only forms a convenient and economical construction for air cooling the motor, but also forms a construction in which the fan is better balanced as regards end thrust. The reaction of the air against the front blades 71 tends to set up an end thrust of the shaft 73 in its bearings. This end thrust is partly compensated by a similar

and opposite end thrust caused by the reaction of the air drawn through the motor against the rear fan blades 72.

The cleaner is drawn back and forth across the floor to be cleaned by means of a handle 80, which is hinged to the cleaner casing. Cast integral with the top of the fan casing 6 are two backwardly extending ears 81 and 82 which are bored and through which is passed a pintle pin 83, one end of which is headed and which is removably retained in place by means of a cotter pin 86 passed through its other end. A second pintle pin 84 extends between the two ears 81 and 82 and forms a pivot for a latch 85. The lower-end of the handle is bifurcated to form two projections or ears 90 and 91 which fit inside of the ears 81 and 82 and are loosely mounted to turn about the pintle pin 83. The ears 90 and 91 have two pins 92 and 93 extending between them in position to be engaged by the latch 85. When the cleaner is in use, the pin 92 is engaged by the latch 85, as shown in Fig. 3, so that the handle is inclined at about 45° to the horizontal and the cleaner can be tilted up on its wheels for more convenient manipulation. When the cleaner is not in use, the latch 85 may be lifted by pressing down with the foot on the toe piece 94 to release the latch and the handle may be lifted so that the pin 93 is engaged by the latch to hold the handle upright over the cleaner, as shown in Figs. 1 and 2, and thus economize space.

The handle 80 is made in two parts, one a sleeve 100 which is permanently secured to the machine and a removable part 101 which forms the main length of the handle. As shown in the drawings, the upper part of the handle is broken away. The removable portion 101 of the handle is about three or four feet long. The hinged ears 90 and 91 are formed integrally on the lower part of the sleeve 100. The upper part of the sleeve is split, as shown in Fig. 2, and is tightened by means of a screw 102 passing through the ears 103 to clamp the removable handle 101 in the sleeve. A lug 104 on the back of the lower part of the removable portion 101 serves to properly position it with relation to the sleeve 100. In the sleeve 100 is a block of hard rubber insulation 105 from which projects into the open upper end of the sleeve two contact plugs 106 which are connected to the motor 3 by means of the wires 107 which emerge from the lower end of the sleeve between the ears 90 and 91. These ears 90 and 91 serve to protect the wires 107 and decrease the chance of accidental breakage. In the lower end of the removable handle 101 is a block of hard rubber insulation holding two socket members 108 in which fit the plugs 106. The socket members 108 are connected to wires

109 which extend through the tubular handle 101 and are connected at its upper end to a flexible electric cord which is connected with a base board plug, electric light socket, or other source of current. The removable portion of the handle is easily taken off so that the cleaner can be more easily stored when not in use.

While the preferred embodiment of the present invention has been specifically illustrated and described, it is to be understood that the present invention is not limited to its illustrated embodiment, but may be embodied in other constructions within the purview of the invention as set forth in the following claims:—

I claim—

1. A pneumatic cleaner having, in combination, a dust collector, an electric motor, and a motor-driven fan comprising a circular web, blades on one face of the web for drawing air through the dust collector and shallow blades on the other face of the web for air cooling the motor, substantially as described.

2. A pneumatic cleaner having, in combination, a dust collector, an electric motor, and a motor-driven fan comprising one set of blades for causing air to pass through the dust collector and a second and independent set of blades for air cooling the motor, substantially as described.

3. A fan for a pneumatic cleaner comprising a circular web, one set of blades on one face of the web and a second and independent set of shallow blades on the other face of the web, substantially as described.

4. A pneumatic cleaner having, in combination, a dust collector, an electric motor, and a motor-driven fan intermediate the dust collector and motor, said fan having on its end next the dust collector one set of blades and having on its end next the motor a second set of shallow blades, an air inlet leading from the dust collector to the center of the fan to deliver air to the first set of blades, a second air inlet opening from the motor casing to deliver air drawn through the motor to the second set of blades, and a common outlet chamber around the periphery of the fan for receiving the air discharged from both sets of blades, substantially as described.

5. A pneumatic cleaner having, in combination, an air pump, a dust collector comprising a dust bag chamber having at one end an inlet for dust laden air, and at the other end a screened outlet for the filtered air, a cage secured to the inside of the dust bag chamber and surrounding the inlet and extending nearly to the screened outlet, and a dust bag having its mouth secured around the inlet and inclosing the cage, said dust bag having a diameter greater than the cage and less than the dust bag chamber and hav-

ing a length considerably greater than the dust bag chamber so as to permit the dust bag to be gathered on the cage and held gathered by contact with the screened outlet of the dust bag chamber, substantially as described.

6. A pneumatic cleaner having, in combination, an air pump, a dust collector comprising a dust bag chamber having an inlet at one end for dust laden air, a cage surrounding the inlet and extending substantially the length of the dust bag chamber, and a dust bag having its mouth surrounding the inlet and inclosing the cage, said dust bag having a diameter greater than that of the cage and less than that of the dust bag chamber and having a length greater than that of the dust bag chamber so as to permit the dust bag to be gathered on the cage and held gathered by contact with the end wall of the chamber, substantially as described.

7. A pneumatic cleaner having, in combination, an air pump, a dust collector comprising a dust bag chamber having a removable cover provided with an inlet opening for dust laden air and an inwardly projecting annular flange surrounding said opening, pins provided with thumb screws projecting from the cover and spaced a little distance from the outside of the flange, a dust bag, and an annular dust bag ring or collar of substantially L-shaped cross section having a cylindrical portion surrounding the flange and an outwardly extending lip fitting against the inner face of the cover, said lip having cut-away portions whereby the collar may be slipped over the flange between the thumb nuts and turned so as to be clamped by the contact of the thumb nuts against the portion of the flange not cut-away, substantially as described.

8. A pneumatic cleaner having, in combination, a dust collector, an electric motor and its casing, and a motor-driven fan having a main intake from the dust collector and an auxiliary intake through the motor casing so as to cause the fan to have the combined function of drawing dust laden air into the dust collector and of drawing clean air through the motor casing to cool the motor, substantially as described.

9. A pneumatic cleaner having, in combination, an air pump, and a dust collector comprising a dust bag chamber, a dust bag in the chamber of greater length than the chamber gathered lengthwise by contact with the end of the chamber, and a distender within the dust bag for maintaining the dust bag distended laterally within the chamber and securing a more uniform lengthwise gathering of the dust bag, said distender extending substantially the entire length of the dust bag chamber, substantially as described.

10. A pneumatic cleaner having, in combination, an air pump, a dust collector comprising a cylindrical dust bag chamber having an inlet at one end for the dust laden air and having a discharge outlet at the opposite end for the filtered air, a dust bag having its mouth secured around the inlet, said dust bag being cylindrical in shape and of somewhat less diameter than the diameter of the dust bag chamber and of greater length than the length of the dust bag chamber so that when the dust bag is placed in the dust bag chamber it is gathered lengthwise between the ends of the dust bag chamber, and a wire distending device within the dust bag for maintaining the dust bag laterally distended and securing a more uniform lengthwise gathering of the dust bag, said distending device extending substantially the entire length of the dust bag chamber, substantially as described.

11. A pneumatic cleaner having, in combination, an air pump, and a dust collector comprising a cylindrical dust bag chamber having at one end a removable front cover with an inlet for dust laden air through it and having at the opposite end an outlet for the filtered air and a guard over the outlet, a dust bag removably secured to the front cover with its mouth around the inlet, said dust bag being cylindrical in shape and of greater length than the length of the dust bag chamber so as to be lengthwise compressed or gathered by contact with the outlet guard when the dust bag is secured to the front cover and placed in the dust bag chamber, and a distender for maintaining the dust bag laterally distended to substantially fill the dust bag chamber and to secure a more uniform lengthwise gathering of the dust bag fabric, said distender extending substantially the entire length of the dust bag chamber between the front cover and the outlet guard, substantially as described.

12. A pneumatic cleaner, having, in combination, a fan, a fan casing, an electric motor for driving the fan, a motor casing, a main air passage leading to and from the fan casing, a dust collector located in said air passage, and a second and independent air passage leading through the motor casing to the fan casing so that air may be drawn through the motor casing and into the fan casing to cool the motor, substantially as described.

13. A pneumatic cleaner, having, in combination, a fan, a fan casing having an opening on one side of greater diameter than the diameter of the fan, a motor casing having its front wall adapted to be secured to the fan casing and to close the opening therein, said wall of the motor casing being provided with an air passage and said casing having an opening to the outer air, a motor located in the casing and having a shaft passing

through the said wall and into the fan casing and carrying the fan mounted thereon, a dust collector, and an air passage connecting the dust collector and the fan casing, substantially as described.

14. A pneumatic cleaner, having, in combination, a fan, a fan casing, a dust collector connected with the fan casing, an electric motor for driving the fan, and a motor casing open at one end and communicating at the other end with the fan casing, so that the fan may cause air to pass through the motor casing to cool the motor, substantially as described.

15. A pneumatic cleaner, having, in combination, a fan, a fan casing having an opening on one side of greater diameter than the diameter of the fan and having an air inlet opening on the opposite side, a motor casing having its front wall adapted to be secured to the fan casing and to close the opening therein, a motor located in the casing and having a shaft passing through the wall and into the fan casing and carrying the fan mounted thereon, and a dust collector secured to the fan casing on the opposite side from the motor casing and communicating with the fan casing through the inlet opening, substantially as described.

16. A pneumatic cleaner, having, in combination, a fan, a fan casing having a flange and an inlet opening on its front side and open at its rear, a motor casing having a front wall adapted to be secured to the rear of the fan casing to close the same, a motor located in the motor casing for actuating the fan, and a cylindrical dust collector secured to the flange on the front of the fan casing and communicating with the fan casing through the inlet opening, substantially as described.

17. A pneumatic cleaner, having, in combination, a fan, a fan casing having an inlet opening on its front and open at its rear, a cylindrical dust collector secured to the front of the fan casing and substantially co-axial therewith, a cylindrical motor casing of less diameter than the fan casing and having its front wall extended in the form of a flange and adapted to be secured to the rear of the fan casing substantially co-axial therewith to close the same, and a motor in the motor casing for actuating the fan, substantially as described.

GEORGE W. ALLEN.

Witnesses:

GEO. E. STEBBINS,
MIRIAM CLEMENT.